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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

December 6, 2012

TO: Internal File

THRU: Daron Haddock, Coal Program Manager

FROM: April A. Abate, Environmental Scientist III and Team Lead

RE: South Fork Quitchupah 2R2S, Canyon Fuel Company, SUFCO Mine, Permit # C/041/0002, Task #4200

SUMMARY:

Longwall mining is proposed under the creek in a panel known as the 2R2 South A LW Block, which was granted approval to mine under Bureau of Land Management (BLM) approval on June 8, 2011. This area is located within the SUFCO mine lease area that CFC operates and maintains responsibilities for.

On October 18, 2012, Canyon Fuel Company (CFC), the Permittee for the SUFCO mine resubmitted an amendment to undermine beneath the headwaters of the South Fork of Quitchupah Creek located within Sections 23, 24, 25 of T21S R4E and Section 30 of T21S R5E. This submittal was in response to the deficiency letter issued by the Division on December 21, 2011 requiring the Permittee to submit additional information that would satisfy the deficiencies outlined in the letter. The resubmitted amendment was also forwarded to the Manti La Sal/Fishlake National Forest for review and comment.

Findings:

[R645-301.731.530]: Water Right 94-113 was found to be small undeveloped seep. The PHC recommended a total of six springs be monitored along the reach of the South Fork of Quitchupah. The seep associated with Water Right No. 94-113, was not included in this group. The location of this seep is approximately 500 feet off the northwest edge of the 2R2S panel (refer to Plate 7-2Av6). Because this is a state appropriated water right and located within the angle of draw where subsidence cracks are possible, please include this seep in the water monitoring protocol.

[R645-301.731.224]: The downstream surface water monitoring point 006D should be added to Figure 7-9 in the MRP and included in the gain/loss surveys to be completed as part of the mitigation plan.

RECOMMENDATIONS:

Please add Water Right 94-113 to the quarter monitoring schedule and the inclusion of stream monitoring of downstream sample 006D to the gain loss survey. The plan is not recommended for approval until these locations have been added.

TECHNICAL ANALYSIS:

OPERATION PLAN

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

The previous hydrology-related deficiencies were identified and were addressed in the resubmitted amendment:

> ***[R645-301-525]:*** *A similar protocol to that of the East Fork of Box canyon should also be adopted at the South Fork of Quitchupah Creek including filming the channel and the corresponding canyon rims. Documentation of the channel width, stream bed substrate, flow conditions, and subsidence cracks along a series of monitoring locations. Monitoring criteria should include fixed vantage points that can easily be reproducible for subsequent monitoring events, collected width and depth measurements of any pools in the stream and height and depth of any cracks. Additional tools should also be used to observe subsidence crack monitoring such as satellite imagery. In the case of East Fork of Box Canyon, a post-subsidence monitoring report was due 90 days after subsidence was complete. Past experience has shown that access to the surface is limited to the summer months where access is available to monitor the stream bed surface and observe subsidence cracks. As a result, the mining of the panel will have to be timed such that access to the surface is possible so that the effects from subsidence can be evaluated.*
>
> ***[R645-301.731.530]****: It is in the best interest of the mine operator, as well as the regulatory management agencies involved to have a well-defined water replacement contingency plan in place prior to the onset of mining under the S. Fork of Quitchupah Creek. This mitigation plan can be incorporated into the PHC prepared for the S. Fork of Quitchupah Creek. Comment letters received from DWRi declared that all surface and groundwater within the drainage that supplies Quitchupah Creek is considered State-appropriated and will be required to satisfy downstream water rights. The USFS expressed concern over the statements made regarding if the mine is unsuccessful in restoring flow after two spring runoff periods and that Canyon Fuel Company will initiate "additional planning and analysis with the Forest Service". The USFS' position is that a solid mitigation plan should be hashed out prior to any water loss or riparian habitat loss.*

Analysis:

The Permittee has created a Monitoring and Mitigation Plan added to Appendix 3-14 of the MRP. A more detailed narrative of the pre-subsidence gain/loss survey of the stream channel is discussed on page 7-51H in Chapter 7 of the MRP. The plan is intended to identify any surface disturbance or impacts from subsidence to water resources, vegetation, and wildlife. Data will be collected before mining begins, during longwall mining, and post-mining until the Permittee, the Division, and the Forest Service all agree that any impacts from mining have been mitigated and that no further data collection is necessary.

The plan commits to a pre- and post-mining stream channel survey to assess stream flow, groundwater discharge, vegetation, soils, subsidence cracks diverting flow, gaining and losing reaches of the stream at four fixed locations along the stream. Semi-weekly flow observations and visual inspections will continue for at least 12 weeks, after the completion of mining under the stream channel. Bi-weekly stream flow monitoring will continue for at least 4 weeks or as conditions deem necessary after the completion of mining under the stream channel. The post-mining survey is scheduled to be completed in 2015.

The Division and the Permittee have had discussions about the timing of the longwall panel. SUFCO intends to begin longwall mining this area in the Fall of 2013. Because longwall mining cannot be interrupted, unfortunately, access to the surface during the initial stage of longwall mining will be inhibited by the weather, making it difficult, if not impossible to follow the monitoring protocol of the mitigation plan. Once access can be gained, then semi-weekly inspections will resume evaluating stream flow, subsidence-induced fractures, water quality degradation if any. The Permittee has committed to a bi-weekly report to the Division and the Forest Service via email documenting the surface effects.

Should fracturing be identified in the stream channel, the Permittee has proposed to repair the fractures with impermeable grout. In this resubmitted amendment, the Permittee further commits to repair any larger fractures in the channel by temporarily diverting the stream and working with a contractor to repair significant cracks. The mine has committed to acquiring a stream alteration permit from the Utah Division of Water Rights should any construction in the stream channel be necessary.

Findings:

The proposed mitigation plan satisfies the Division's prior concerns associated with mining under the perennial stream. The plan meets the Utah Coal Rules.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

The Permittee provided updates to Chapter 7 - Hydrology of their MRP and a new PHC report submitted as Appendix 7-26. The following deficiencies were addressed with this submittal:

[R645-301.724.100]: *There are no groundwater monitoring wells in the canyon where the South Fork of Quitchupah Creek flows. As a result, baseline data from the nearest perched aquifers (if any) closest to the surface is absent. A groundwater well in the vicinity of the stream channel is essential for characterizing baseline groundwater conditions. The additional well in the stream channel will also be instrumental in measuring any losses of perennial flow from the stream that could migrate from fractures in the surface to any groundwater system below. A rise in the groundwater water table will provide important data to help better mitigate effects from loss of surface flow. Furthermore, based on the orientation of the proposed 2R2 panel and the panel adjacent south, it appears that groundwater monitoring well US-81-4 will be destroyed eventually by longwall mining. Please advise the Division if there is a plan to eliminate this well via mining and provide a proposed location for a replacement well.*

[R645-301-724.100]: *Geologic resources, baseline and operational data should be included in the Probable Hydrologic Consequences (PHC) report prepared for the South Fork of Quitchupah Creek along with discharge and solute composition of the surface and groundwater properties of all hydrologic resources in the area. Currently, a lack of baseline data from springs, seeps, stock watering ponds and groundwater monitoring wells exists in the area. The locations of the water rights from springs, point to point diversions and stockwatering ponds identified on the adjudication map provided by the Division of Water Rights (DWRi) require field verification with other interested stakeholders such as the US Forest Service, DWRi, the Division and mine personnel. A consensus should be reached among all stakeholders which groundwater resources and ponds should be targeted for an active baseline water monitoring program. An interagency field reconnaissance will need to be scheduled in the summer of 2012 to identify critical groundwater and stockwater resources in the area.*

[R645-301-728.100]*: A PHC needs to be developed by the operator for the proposed longwall mining below the South Fork of Quitchupah Creek. Similar to the PHC for the 3 Left Modification Panel found in Appendix 7-19 of the SUFCO Mining and Reclamation Plan, full characterization of groundwater and surface water systems for the South Fork of Quitchupah Creek needs to be developed prior to the undermining of the*

South Fork of Quitchupah Creek via longwall mining. The PHC will outline the risks of significant disruption to the hydrologic balance to the hydrologic resources within the area of the South Fork of Quitchupah as well as any nearby springs, seeps and stockwatering ponds found in the area.

***[R645-301.731.224.1]**: Quarterly laboratory analytical data will be collected on the stream samples SUFCO 006, as defined in the water monitoring protocol of the MRP on page 7-41. However, additional surface and/or groundwater samples should be collected for total iron if a visible iron precipitate is noted within the stream channel or originating from the springs and seeps.*

Groundwater & Surface Water Monitoring Plans

The Permittee added six additional springs to the water monitoring plan outlined in Table 7-2. The sampling protocol for these springs will be quarterly field measurements while mining is occurring under the 2R2S panel, then quarterly for a period of two years thereafter.

The Permittee added two additional surface water sample locations along the South Fork of Quitchupah Creek - SUFCO 006C and SUFCO 006D outlined in Table 7-2. The sampling protocol for these surface water locations will be quarterly field measurements while mining is occurring under the 2R2S panel, then quarterly for a period of two years thereafter. The Permittee submitted a new Figure 7-9 showing the locations of all surface water sampling locations along Quitchupah Creek. The furthest downstream sample 006D is not shown on this map.

Since the original amendment for the undermining of the South Fork of Quitchupah was sent back with deficiencies, the Division performed two field reconnaissance visits to the area. The first took place on June 5, 2012 and on August 28, 2012. During the August visit, the portion of the stream channel located within the canyon was walked. The channel did appear to predominantly flow on bedrock, making it prohibitive to install monitoring wells or piezometers. According to the map, the stream bed substrate consists of Castlegate bedrock followed by Blackhawk bedrock as the channel progresses further to the east. Bedrock was in fact observed for the majority of the length of the channel. A visual assessment of the stream bed while on the field trip confirmed this. The Division feels that the comprehensive water monitoring along the stream channel along with a post-subsidence survey should adequately assess the health of the hydrologic balance of the stream channel.

State-Appropriate Water Supply

Listed water rights in the form of stock ponds and springs were documented in the vicinity of the panel. The locations of the stock ponds were visited during the 2012 field inspections. The ponds appeared not to actively be in use by cattle. The springs and seeps that were documented as water rights were hiked to in the upper reaches of the drainage.

Most of the headwaters area is located outside of the panel area; however, a portion of panel directly underlies Water Right 94-1396 and is directly adjacent to 94-113. Both of these water rights are owned by the Forest Service. The first is a point to point use for stock watering along the stream. Water Right 94-113 was found to be small undeveloped seep. The PHC recommends that a total of six springs be monitored quarterly for field parameters along the reach of the South Fork of Quitchupah, then two years after undermining. The point to point water right 94-1396 is covered by monitoring at Roberts Spring, RS-A and RS-B as part of the new monitoring protocol for Quitchupah Creek. The seep with Water Right No. 94-113 associated with it, was not included in this group. The location of this seep is approximately 500 feet of the edge of the 2R2S panel. Estimates for the angle of draw in the Wasatch Plateau range from 12 deg to 20 deg. Surface expression of tension cracks based on the depth of the coal to be mined and a 15 degree angle of draw range from 241 to 482 feet. Because this is a state appropriated water right and located within the angle of draw where subsidence cracks are possible, this seep should be included in the water monitoring protocol.

Probable Hydrologic Consequences Determination

The PHC confirmed the presence of two newly discovered springs within the deep incised reach of the South Fork of Quitchupah creek. The springs, known as Wedge and Amanda spring daylight relatively close together and at similar elevation. These springs reportedly discharge at the base of the Castlegate Sandstone at rates of approximately 4.5 and 0.3 gallons per minute, respectively. An additional stream monitoring point 006D was established further downstream of the springs in light of their discovery. Wedge and Amanda springs do not have any associated water rights listed for them, nor was there any evidence that they have been developed for any use other than wildlife.

The PHC discusses gain/loss survey studies that have been conducted on the South Fork of Quitchupah Creek from 2009 - 2012. The most recent gain/loss survey was performed in June 2012 during a time when no flow was present in the channel and only meager flow was discharging from the springs. The Permittee has committed to performing a pre-subsidence and post subsidence gain/loss survey of the stream channel at fixed locations along four stream monitoring stations: 006, 006A, 006B and 006C. The study will identify gaining or losing reaches of the stream channel. Baseline data hydrographs collected to date show that upstream

location 006A to 006B show a loss of discharge as the stream flows along the transition zone between Price River section of the stream substrate and the Castlegate formation. Once in the canyon there is a slight increase in flow at 006C. Unfortunately, there is not enough baseline data to document the gain or loss of water from the newly-established monitoring point 006D. Gain/loss surveys should include downstream monitoring point 006D.

Findings:

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